Snow and Ice Removal

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As soon as one winter is over, it is time to start making plans for the control of snow and ice during the coming year. Years of experience in combating snow and ice are probably the best guides in this field of road maintenance.

The cold weather map of the United States indicates that over half of its area has freezing weather for at least 100 days of the year. Little wonder, then, that winter maintenance and ice control have become major problems in the majority of highway programs.

The necessity for keeping highway transportation functioning, coupled with recognition that highways maintained for travel in winter provide the source of more gas tax revenue than is required to keep them open, has resolved the problem into one of practical efficiency and economy.

Planning

Preparation for snow and ice control starts when the winter season is over. All equipment, including trucks, graders, motor patrol, and mechanical spreaders, should be given a thorough inspection for condition and any repair work to be done. Plows and mechanical spreaders should be painted and stored. Additional equipment that is needed should be recommended for purchase.

About the first of November snow fence should be erected on all roads where severe drifting is anticipated.

Abrasives such as sand and cinders should be placed in suitable quantities at strategic points to give ready accessibility for distribution as needed.

The abrasives should be treated with calcium chloride to prevent freezing in the stockpile or storage bins. Fall stockpiling of abrasives is a primary function in ice control practice because raw abrasives as found in pits often freeze solid through the winter, making them unavailable when needed. Some grading to size is generally required to facilitate uniform spreading, and this cannot be readily accomplished in freezing weather. This material should be treated with about 100

pounds of calcium chloride to the cubic yard and stored in large piles. A good practice is to cover the piles with waterproof paper or the used calcium chloride bags. Test data have shown that sand abrasives with 3 to 4% moisture give approximately twice as much traction as sand with 2% or less moisture. Cinders with about 10% moisture provide the highest coefficient of friction.

These stock piles should be at points throughout the subdistrict in order to minimize the hauls, and to have material available at or near the critical section where snow and ice hazards are expected. All railroad crossings, overheads, and grades of over 3%, depending on the length, should have a series of stock piles available at any time to commercial vehicles in case the maintenance crews have not yet arrived to place abrasives on the surface.

Prearrangement should be made for obtaining additional equipment such as motor patrols, snow loaders, and trucks in order to be prepared to remove snow from city streets under severe and heavy snowfall. Patrolmen's meetings should be held in the late fall, and a system worked out where the work of each patrolman could be dovetailed into that of the adjoining section of road or subdistrict.

The allocation of equipment to the different patrols should be influenced by the miles of roads and types of roads in the patrol. The patrol that has divided-lane pavement or four-lane pavement needs three units to do the job. All the snow must be plowed from the center out to the shoulder in one operation; otherwise, a traffic hazard is created. All patrols should have one underbody scraper; a V-type snow plow is also quite essential where heavy drifts have to be moved back on the shoulders or where roads have narrow right-of-way. Such roads will drift badly and the snow cannot be pushed back sufficiently to overcome this tendency. Patrols which include the streets need the one-way plow and underbody scraper, and in the heavily traveled areas, a patrol grader. These units should travel together in order to move the snow to the gutter in one operation.

Communication

A system of communication is very important in the organization for snow and ice removal. It is almost imperative that all patrolmen have telephones, for the superintendent is at a tremendous disadvantage if he must personally contact each patrolman or machine operator in case of a severe storm at night. A delay of one or more hours in getting out on dangerous hills and curves may cause several fatal accidents. The only practical and efficient way of handling snow removal is in

getting started with the storm and not after traffic has packed the snow on the pavement. This can be done only if the patrolmen and superintendent have a good communication system.

The patrolman should call the superintendent before going out on his roads. He should call again after he has plowed them out, or in between, if he is not able to cope with the situation, so that the superintendent can send additional help. At times, certain roads or areas will receive more snow than others, or certain roads will tend to drift more than others. The superintendent should notify the district office as soon as possible of road conditions, and ask for additional help if it is needed.

It is also very important that some one take charge of the incoming calls at the subdistrict office. The job can be assigned either to the stock clerk or the subdistrict clerk, when the storm comes on Sundays, holidays, or other hours of the day when the office is normally closed.

Too much stress cannot be put on prompt and speedy action, as this is of vital importance. This means cooperation with the state police, local police, railroads, bus lines, and public utilities who may warn your patrolman or superintendent of any storm which begins during the early hours of the morning, as most sleet and snow storms do. This system of contact or warning will give your crews a chance to "jump the gun" and be on the roads at the beginning of the storm to keep traffic moving in a safe and convenient manner.

Snow Plowing

In plowing snow no set rules can be given. Every storm is different, and is the result of variation in temperature, atmospheric conditions, and whether it occurs in the early or late months of winter. During a light snowfall, the snow can be plowed efficiently with the one-way-type plow which has the grader- or bulldozer-type action. After snow has been removed from the pavement sufficiently to allow the full width of the pavement to be traveled, all hazardous places should be cindered or sanded with material that has been treated with the usual amount of one sack of calcium chloride to the cubic yard, added to the abrasive when stored, plus one to two sacks of salt to the cubic yard, depending on the amount of packed snow (and ice) to be removed.

The roadway should then be widened by plowing back the snow as far as possible with either one-way or V-type plows. If after all this work is done, packed or loose snow still remains on the pavement, motor patrol graders, pull-type graders and underbody scrapers should be em-

ployed to remove the rest. For a heavier snow, large V-type plows attached to large units are necessary, especially when heavy drifting accompanies the snowfall. Since the majority of our pavement widths are from 18 to 22 feet, it is possible to plow half the pavement at a time without creating a traffic snarl or hazard. On pavements of 30 feet and wider, it is better to employ as many plows as necessary in order to clean half the pavement at a time. This is usually done by placing two or three plows in diagonal formation across the pavement from center to outside.

Every subdistrict has its own system, depending on the type of equipment, but in the end it all reverts to the same procedure. After all the above operations have been completed, the cleaning-up process begins. Snow should be taken off bridges, intersections cleaned, driveways opened, drains opened, and other structures or locations cleaned up where melting or plowed snow may create a freezing problem or prevent plows from working satisfactorily in case of another storm. This usually requires from three to seven days.

Snow removal in towns and cities presents two distinct problems. First, we have the through traffic to accommodate, which we can do by plowing the snow to the curb line. But as the snow increases in depth, we are confronted with the problem of hauling the snow away from the business district in order to accommodate the traffic which wishes to park. In most cases, it is more desirable to blade the snow to the center of the street, either with a motor grader or underbody truck scraper, and then load the snow out with a pneumatic-tired tractor equipped with a high lift.

A truck crane can also be used for loading out snow if a high-lift tractor cannot be obtained. Some cities still have the streetcar tracks in the center of the street, thus making it necessary to plow the snow to the gutter line and load it out from there.

The city police are very cooperative if they are informed in advance when the highway forces plan on hauling out the snow, and in this way local traffic may be prohibited from parking while the snow removal operation is going on. That is, each city block can have traffic prohibited from parking while our forces are working.

Ice Control

Ice control is a phase of winter maintenance that, unless handled promptly, can cause considerable damage and criticism. When ice covers the pavement, it is a difficult job to remove it, and removal cannot be accomplished when the temperature is below 20° unless artificial means

are used. About the best method I know is to apply to the road surface an abrasive that has been treated with calcium chloride supplemented with salt, applied with a spinner. Raw calcium, or salt if preferred, can be applied to the center of the pavement. In from four to six hours the treatment will melt through the ice and reach the pavement and cause a melting action between the ice and pavement. It is then possible to remove the ice by the use of a grader, one-way plow, or underbody scraper.

Hills, railroad crossings, and curves should be treated first, then the entire length as long as the ice remains. The use of graders and underbody scrapers while the ice and slush is forming is a very good preventive.